

What's your opinion about NAPPING on the job?



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Benefits of Napping in Shift Work

James Clark & Hans P. A. Van Dongen, Ph.D.

About the Authors: James Clark is a biochemistry student at the University of Surrey in England. Last year he was on placement at the Sleep and Performance Research Center at Washington State University, Spokane. Dr. Van Dongen is a Research Professor and Assistant Director of the Sleep and Performance Research Center at Washington State University, Spokane. His research focuses on basic and applied aspects of fatigue risk management, and he has made seminal contributions to the understanding and prediction of changes in fatigue over time.

Shift Work and Sleep Loss

Daytime sleep after night shifts is usually restricted to between 4 and 6 hours per day (Åkerstedt, 1998). In addition, no more than 5 to 6 hours of sleep per day is typically obtained before morning shifts, if the shift starts at 06:00 or earlier (Kecklund et al., 1997). This loss of sleep causes sleepiness and elevated pressure for sleep, which in turn increases the risk of performance impairment and unintentionally falling asleep during the shift (Åkerstedt et al., 2002). Involuntary sleep onset may thus occur at times when it is prohibited or ill-advised (Torsvall and Åkerstedt, 1987), putting workers at increased risk of accidents. One way to decrease this risk is by taking a nap.

Prophylactic Naps

A prophylactic nap is a nap that can be seen as “defensive”. This means it is implemented before one actually feels fatigued, and is thus typically taken proactively before the beginning of a shift. Although prophylactic naps do not maintain performance at fully optimal levels and are no substitute for normal nighttime sleep, they produce longer lasting performance benefits than naps taken when fatigue is already present (Dinges et al., 1988).

Prophylactic naps would often be taken in the afternoon or early evening, when the circadian (i.e., 24-hour) rhythm of alertness is near its peak and it is difficult to stay asleep for long. Still, even a short daytime nap of 30 minutes or less may improve performance for up to 2–3 hours (Gillberg et al., 1996; Brooks and Lack, 2006). In general, though, the longer the prophylactic nap, the more effective it is (Ficca et al., 2010).

Supplementing Reduced Sleep

An issue frequently encountered in shift work is the limited amount of sleep obtainable after a shift. This seems especially true when a (prophylactic) nap was taken before the shift began (Kiesswetter, 1993). However, when comparing individuals who only sleep after their shift to individuals who take a nap prior to their shift and also sleep after it, the total amount of sleep obtained is usually the same (Rosa, 1993) or sometimes even longer in the individuals taking the prior nap (Ishibashi et al., 1982).

Relatively short naps (say, 20–30 minutes) do not seem to affect the amount of sleep obtainable in the daytime after a shift (Sallinen et al.,

1998; Purnell et al., 2002). This means that shift workers may be able to take brief naps without significantly disturbing their main sleep period.

Split Sleep Schedules

Split sleep schedules involve obtaining the daily total amount of sleep through a restricted main sleep period, sometimes termed “anchor sleep”, combined with a nap. An example would be a 5-hour nighttime anchor sleep followed by a 3-hour daytime nap. The anchor sleep could also be during the day and the nap during the night. Split sleep does not provide greater performance benefits than unrestricted nighttime sleep, but it is often an effective compromise when normal nighttime sleep is not achievable. In long-haul truck drivers, it effectively mitigates nighttime fatigue and performance impairment (Macchi et al., 2002).

As a rule of thumb, the recuperative value of sleep is a function of the total amount of sleep per 24 hours, regardless of whether it is in the form of a single consolidated sleep period or as a split sleep schedule (Mollicone et al., 2008). In other words, every hour of sleep counts regardless of when during the day it is obtained.

On-Shift Napping

On-shift napping has been shown to be beneficial to mitigate fatigue (Purnell et al., 2002). Studies in aviation have demonstrated that a planned 40-minute nap in the cockpit helps to maintain good performance during both day and night flights (Rosekind et al., 1995). In air traffic controllers, even short and poor quality naps during work hours have been shown to mitigate fatigue (Signal et al., 2008).

In ambulance paramedics working 24-hour shifts, a 5.5-hour period during which they did not have to answer emergency calls and could take a nap was found to alleviate subjective fatigue (Takeyama et al., 2009). A 1-year long study of shift workers receiving a 1-hour nap opportunity during their night shifts provided evidence of improved vigilance (Bonfond et al., 2001). The shift workers in the study reported general satisfaction about quality and easiness of work at night.

Benefits of Napping in Shift Work cont.

Noise and light have been reported as two major reasons for disturbed nap sleep (Koller et al., 1994; Purnell et al., 2002). Access to an isolated sleeping facility promotes the effectiveness of on-shift napping.

Sleep Inertia

There is a potential disadvantage to on-shift napping, namely sleep inertia. This is the feeling of grogginess and the transiently degraded cognitive performance experienced immediately following awakening (Dinges, 1990). It is generally considered to dissipate within about 30 minutes after the end of a daytime nap (Dinges et al., 1981). However, the duration of sleep inertia varies by the length of the nap. For example, a 30–50 minute nap may produce around 10–15 minutes of sleep inertia (Sallinen et al., 1998), whereas the duration of sleep inertia may be extended following longer naps.

The intensity of sleep inertia is greater after naps taken at night than after naps taken during the day (Dinges et al., 1985). Very brief naps of 10 minutes or less are usually not associated with sleep inertia, and may still improve performance for up to approximately 2.5 hours (Brooks and Lack, 2006).

Subjective and objective measures of sleep inertia seem to be disconnected (Achermann et al., 1995), such that performance may be either better or worse than the subjective experience of sleep inertia would suggest. Sleep inertia effects may be counteracted by caffeine (Horne and Reyner, 1996; Van Dongen et al., 2001).

Why Naps Work: Sleep Homeostasis

The effectiveness of napping can be understood on the basis of sleep homeostasis. This is a biological process that builds up a pressure for sleep during wakefulness, and dissipates this pressure during sleep. This occurs in an exponential manner – see Fig. 1. As a consequence, most sleep pressure is dissipated in the beginning of a sleep period, making a brief nap disproportionately effective in reducing sleep pressure over the short term.

Conclusion

Napping helps to maintain alertness and performance during shift work. Long prophylactic naps and short on-shift naps tend to be the most effective napping strategies, although different circumstances may call for different napping approaches. There is no substitute for sleep when it comes to managing fatigue, so when sleep opportunities are restricted due to shift work, napping could be the fatigue countermeasure of choice.

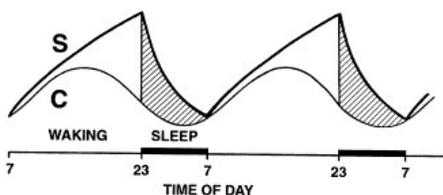


Figure 1: The biology underlying the effectiveness of napping. Sleep homeostasis (displayed as process S) is a biological process involving the build-up of sleep pressure during wakefulness (here 07:00–23:00) and the dissipation of this pressure during sleep (here 23:00–07:00). Sleep

homeostasis is an exponential process, such that sleep pressure is dissipated faster in the beginning of a sleep period. For that reason, a short nap is disproportionately effective in reducing sleep pressure over the short term. Also shown is the circadian rhythm (displayed as process C), which provides a waking counter-pressure which is greater during the day than during the night. Spontaneous awakening from sleep occurs if the sleep pressure from process S drops below the wake pressure from process C. Figure taken from Borbély and Achermann (2005) with permission.

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